and subtracting equation (2) from (5)

$$\frac{1}{2}(I_{\text{max.}} + I_{\text{min.}}) - I_0 = cn^2 - 3dn^3 + 7en^4 - 15fn^5 + 31gn^6 + \text{etc.}$$

and

$$\frac{\frac{1}{2}(I_{\text{max.}} + I_{\text{min.}}) - I_0}{2} = \frac{1}{2}cn^2 - \frac{3}{2}dn^3 + \frac{7}{2}en^4 - \frac{15}{2}fn^5 + \frac{31}{2}gn^6 + \text{etc.} \ldots \quad (6)$$

Equation (6) gives the change in grid current obtained by the graphical method of taking

$$\frac{\frac{1}{2}(I_{\text{max.}} + I_{\text{min.}}) - I_0}{2}$$

and equation (4) gives the true value of change in current. It will be seen that the difference is only very small until the 5th and 6th powers are reached, and in most cases the operating part of the grid curve can be represented by an equation containing terms up to the 4th power only, with reasonable accuracy, and, even if higher terms are necessary, the error in using the graphical method is not great.

APPENDIX 3.

Point of $E_g - I_g$ Curve with Greatest Change of Slope.

It can be shown that the most efficient point of the curve on which to operate is the point where the rate of change of slope is greatest, and the following simple method determines this point. Referring to Fig. 5, join points of equal intervals of grid volts along the curve of straight lines, then the rate of change of slope is greatest where the deviation from the straight line is grea

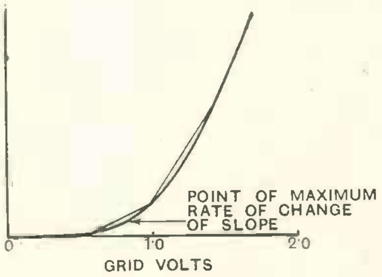

Fig. 5.—*Method of finding optimum point of curve.*

OBITUARY.

THE death occurred on February 18th of Dr. D. W. Dye, at the early age of 44. We met him first in 1906, as a student at the City and Guilds Engineering College in South Kensington. In 1910 he went to the National Physical Laboratory and he spent the rest of his life there. Nobody has done more to uphold the international reputation of the N.P.L. for electrical measurement of the highest attainable accuracy. He was a worthy successor of Albert Campbell and Sir Frank Smith, and only those who have been closely associated with him and know the amount and character of the work which he has done, the enthusiasm with which he attacked the most difficult experimental problems, and the grim determination with which he sought and eliminated the various sources of error, will be able to realise what a loss has been sustained by the N.P.L. and by the many other organisations with which he was associated.

In 1924 he contributed to *Experimental Wireless* a series of articles on the Intervalve Transformer.

In recent years he devoted himself specially to the study of radio frequency standards and measurements. He developed the multivibrator controlled by a tuning fork and by means of a phonic wheel obtained records on a tape side by side with records from a standard clock, thus giving a direct comparison between the radio frequency and the standard clock. He had recently devoted much attention to quartz oscillators and had developed a new type which, when maintained at a steady pressure and temperature, operated with a constancy beyond anything previously attained.

Dr. Dye was awarded the D.Sc. degree of London University in 1926, and he was made a Fellow of the Royal Society in 1928. He was a member of the Standards Committee of the Radio Research Board and honorary Secretary of the British National Committee of the Union Radio Scientifique Internationale. He acted as Chairman of the Commission on Radio Standards at Washington, Brussels and Copenhagen.

GENERAL GUSTAVE FERRIÉ, the head of the French military wireless service, died on February 16th, at the age of 63. He had been associated with radio telegraphy since the earliest days, for he was present in 1898 when Marconi made his experiments across the English Channel. He not only built up the French military wireless service, but he was a great pioneer in the application of radio telegraphy to other branches of science, especially to the accurate transmission of time signals, so enabling the longitude of any part of the earth's surface to be determined to a degree of accuracy hitherto impossible. He was President of the Union Radio Scientifique Internationale. In 1919, Oxford University conferred upon him the honorary degree of Doctor of Science. The most striking evidence of the esteem in which he was held by his own countrymen was afforded two years ago when a special law was promulgated exempting General Ferrié from the law under which he should have retired and concluding with the words " le général de division Ferrié est maintenu en activité sans limite d'âge."

Those who have met him in London or elsewhere, or who have experienced his kind hospitality in Paris, will mourn the loss of a most lovable personality. G. W. O. HOWE.